ASSISTING STUDENT UNDERSTANDING OF THE RELATIONSHIP BETWEEN LAND AND WATER

Action Research:

Assisting Student Understanding of the Relationship Between Land and Water

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**Introduction and Background**

The journey began when a group of three teachers from Denmark Elementary School signed up for a summer class called Earth Partnership for School. The class looked “fun” and interesting, while manageable with the busy lives that we lead. Going into that week of institute, I never knew the impact that it would have on my students and me.

Denmark Elementary School is one of two elementary schools in Denmark, however it is the only public elementary school. Denmark is located about ten miles from Green Bay, Wisconsin. This small, rural community has about 2,000 people. The elementary school has about 500 students from various neighboring communities. Within each grade level at the elementary school, there are either four or five sections of each grade. Each class varies however, the average class size ranges from 20-26 students.

After taking the summer class, these three teachers were inspired to do more with the Denmark Nature Center. The knowledge taken away in one short week was incredible and the desire to do more drove us to take the second class during the school year to increase knowledge for our own use, as well as to aide in our new outdoor education endeavors. Each of us had different areas of curriculum to study, but the common theme was to get kids outside and aware of the world around them. The concern that is being addressed through this research project is that water awareness is very limited among the younger students in Denmark. The people who were affected through this project were the fourth grade students and teachers.

**Question Formulation**

Through reflection of the students, the existing curriculum, and myself, the action research question being addressed is, do additional hands on activities about the water cycle improve the students’ abilities to understand the imperative relationship between land and water? There were so many great resources from the Earth Partnership for School that I knew these kids needed more depth. The students needed to know the impact that they, as fourth graders at Denmark Elementary School, have on this world. They needed to know that yes, they can make a difference. Even children’s decisions affect nature and those that live in and around it.

**Literature Review**

As I was researching, it became apparent that not only do students in Denmark need awareness, but also as Mike Weilbacher says in his article, “The Window into Green,” “students are extraordinarily disconnected from the environment.” He also says that there is a “world of children rapidly retreating from outdoor play and time spent in nature.” I knew I had my work cut out for me to bring this huge issue to my fourth graders. I know the importance for kids to be outside and also that there are many kinesthetic learners who learn best by moving around and doing hands on activities. Even my visual learners would excel if I could bring this process to sight for them. Many children do not go outside to play anymore however, when they are at school, being outside is motivational to them.

With this knowledge, I knew that I needed to know more about outdoor education and how to teach the water cycle in a hands on way. I found a great article called “The Ecology and Culture of Water” by James M. Patchett and Gerould S. Wilhelm which has advanced concepts when talking about fourth graders however, I did find some great points to bring down to my kids levels. One statement that struck me was, “All places and living things can be defined by the way they handle these two resources,” the two resources being water and light energy. If I could get my students to understand this concept, I would be teaching my fourth graders not only a lesson about water, but about life. As I kept reading, I knew I had to pursue this project when I read the following statement, “Understanding the human relationship to the interaction of water with the geology, soils, topography, flora, and fauna unique to a place is a first step by which a culture can learn to live sustainably.” (Patchett and Wilhelm, 1999). This quote is what really made me research more in depth as to how I could give my students what they needed to be global citizens.

When I began to research different activities, I found the Freshwater 101, activities from the Earth Partnership for Schools Summer Institute extremely helpful. I decided to take this activity to begin the unit in order to give my students a strong water foundation before we even began the Land and Water Einstein Kit. With these activities, incorporation of the Nature Center, and the current curriculum, I now had a plan that I wanted to research if I could bring about the awareness that these students were lacking.

**Data Collection and Instruments**

I teach two sections of fourth grade science and try to pace the two classes in the same way. One class of twenty-six students received the supplemental materials while the other class received the regular science curriculum. In order to help see if these supplemental activities were helpful, I created a pre and post assessment to administer to the students. I then analyzed the data to see if the additional activities made a difference in student responses on the post assessment.

Another way that I planned to document student knowledge acquisition was through an interview. I wanted to find out if the students thought that they learned better or worse using the Nature Center. Only the class that received the supplemental activities took the interview. Through this interview, I also wanted to find out if the students enjoyed being in nature and why it was motivational to them. There is research that is beginning to support outdoor education with students that have disabilities however; I wanted to be sure that if I was adding this project with the Nature Center to the curriculum, that the students found it helpful in their learning.

 I documented the student activities by taking pictures. These artifacts will show the students out in the Nature Center. The pictures are also of students exploring the water cycle and taking pictures as their evidence. Their work is also another artifact of the knowledge that they gained.

As I used these instruments to gauge the effectiveness of the activities, it is important to note that there was a range of activities that were used. I began the unit with giving some background knowledge from the Freshwater 101 materials supplied in the Earth Partnership for Schools binder. When doing this background information to set the stage for these students, the kids made Water Rulers (Appendix A). The students first guessed how much fresh and salt water was available to us on the planet. We then found out the actual amounts and colored the rulers to show this data in a visual representation. As a class, they then discussed where they could find the different types of water. For example, much of the fresh water is frozen in ice caps, some is in the atmosphere and very little is actually available in lakes, streams, etc. The students were extremely amazed at how little water is actually available to us. They definitely took it for granted that we live by a huge water source and that they turn on the faucet and clean water is there for their taking.

After the students found out how much water was available to them, I taught them what watersheds are. Through the first Earth Partnership for Schools class, I learned about watersheds and thought it was important for students to see how all of the waterways are important even if it’s a tiny creek in someone’s backyard. We used Internet websites to locate our watersheds and then also looked where there are smaller bodies of water right here in our school campus. While doing this, I also had students clean up garbage and we discussed how each type of garbage would be harmful if it got into our drinking water. The students have been aware of garbage ever since. Even when we were in the Nature Center for our buddy time, they continued to pick up garbage whereas in the beginning of the year they just let the garbage be. They were outraged to learn that rain, wind, storm water and many other factors bring this pollution to our drinking water.

Within the Land and Water Kit, I then taught the water cycle lesson to both classes in the same way. The difference came about when the group who received supplemental materials was able to play The Water Cycle game (Appendix B). I took this game from Freshwater 101 also. In this activity, students were in groups and they travelled through the water cycle. Bags were placed around the room with names of places where water molecules move through the cycle such as a field, cloud, glacier, animal, human, lake, etc. When the students came to a bag they had to pick out a slip of paper. The papers had different scenarios and required students to move according to what happened to that molecule. The students had to record their journey as a water droplet. During the experience, many students said, “Mrs. Reis, we were just at the cloud, stream, field, etc.” The movement of the students truly helped them see the cyclical pattern of the water cycle.

Another way that I was able to get students to think differently about the water cycle is by having them write a story in the perspective of a water molecule. With the assignment named Sop, the Drop (Appendix C), students were required to start and complete a whole cycle in any way that they desired. This assignment was difficult for some children because it is not a cycle that repeats exactly the same way. This assignment required the students to think in a sequential order and yet use their imaginations. I was impressed that some students incorporated dialogue and gave their molecules expressions and emotions. Most of the students enjoyed this imaginative story and were able to come up with some sort of cycle.

After this experience, students were given the opportunity to go into the Denmark Nature Center to find the different parts of the water cycle (Pictures in Appendix D). The day that we went outside was a day after a very heavy rain. Students were given a sheet with a picture of the water cycle and some prompting questions (Appendix E). They then had to use IPod Touches to take pictures of the water cycle and be able to defend why each picture was a part of the water cycle and which part it fit into. The following day we had very heavy rain and hail again so we were able to get all of the parts of the water cycle that the students needed to know. The students asked great questions and took this project seriously. The sophisticated thinking that they displayed blew me away.

After students collected pictures, I printed them off and broke students into groups. The students then needed to create a presentation for a part of the water cycle. Each group had to use the pictures, define the part of the water cycle, and give examples of where they might find evidence of it. The students then needed to present their posters to the class (Appendix F). The class also had to figure out a way to organize the posters in a way that represents the water cycle. The groups did a nice job with this. When students can turn around and become the expert, I know that they have acquired the knowledge.

**Data Analysis and Findings**

After looking at the data, the supplemental activities did in fact help the students to understand the imperative relationship between land and water. With the pre assessment, it became apparent that the kids did not know what a watershed was. They also had many different